



U.S. Environmental Protection Agency
Region 8
Technical and Management Services

Laboratory Services Program

Certificate of Analysis

Ref: 8TMS-L

MEMORANDUM

Date: 08/13/15

Subject: Analytical Results--- **Upper Animas_SED 4_AUG 2015_A096 / A-098**

From: Don Goodrich; EPA Region8 Analytical Chemistry WAM

To:
Paula Schmittdiel
Superfund
8 EPR-SR

Received Sample Set(s), [Work Order : Date Received]:

[C150804 : 08/12/2015]

Attached are the analytical results for the samples received from the Upper Animas_SED 4_AUG 2015_A096 sampling event, according to TDF A-098. All analyses were performed within their method specified holding times unless otherwise noted in the following narrative.

These samples were prepared, analyzed, and verified by the Environmental Services Assistance Team Laboratory (ESAT) according to the requirements of the Technical Direction Form(TDF).

Note: The laboratory herewith transmits this deliverable to the program/project partner for determination of "final data usability" which may include data validation and data quality assessment per and in accordance with EPA QA/G-8, *Guidance on Environmental Data Verification and Data Validation* November 2002, EPA/240/R-02/004. Laboratory data qualifiers are applied based on the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, October 2004, referred to as "NFGI".

Laboratory policy is to dispose of any remaining sample 60 days after data analysis packages are delivered to EPA. If you would like the laboratory to retain the samples for a period longer than 60 days, please contact Don Goodrich within the 60 day period at (303) 312-6687.

Case Narrative**C150804**

Quality Assessment Unless indicated by exception, the QA/QC associated with this sample set produced data within the TDF-specified criteria.

Holding Times: All samples were analyzed within their method-specified technical holding time(s).

1. Initial and Continuing calibration blanks (ICBs and CCBs).
Exceptions: None.
2. Preparation (PB) / Method blanks (MB)
Exceptions: In ICP-OE batch 1508086, manganese was detected in the prep blank. All sample detections for manganese were significantly above the level of contamination. No qualifiers were assigned.
3. Interference Checks (ICSA / ICSAB) for ICP-MS and ICP-OE analyses only.
Exceptions: None.
4. Initial and Continuing calibration verification analyses (ICVs, SCVs and CCVs).
Exceptions: None.
5. Laboratory Control Sample (LCS) or second source analysis or SRM.
Exceptions: None.
6. Laboratory Fortified blank (LFB) / Blank spike (BS), same source as used for the matrix spikes.
PBS performed with analyses/methods requiring preparation or digestion prior to analysis.
Exceptions: None.
7. Contract Reporting Detection Limit Standard, labeled as CRA, CRDL or CRL.
Exceptions: None.
8. Laboratory Duplicate (DUP). "Source" identifies field sample duplicated in the laboratory. If either the "source" or the duplicate result is <5X the reporting limit, the %D limit of 20% does not apply.
Exceptions: None.
9. Laboratory Matrix Spike (MS) and spike duplicate (MSD). "Source" defines original field sample fortified prior to analysis. Percent recovery (%R) limits do not apply when sample concentration(s) exceed the corresponding analyte spike level by a factor of 4 or greater.
Exceptions: In ICP-MS batch 1508094, antimony recovered low in the MS2 and MS4. No qualifiers were assigned since all other QC requirements for antimony were met.
10. Serial Dilution sample analysis (SRD). "Source" is parent field sample diluted 1:5 in the laboratory.
Performed for ICP-OE and ICP-MS metals analyses. Percent difference (%D) limits do not apply when analyte concentration(s) are below 50x the source sample's MDL (or 10x it's PQL).
Exceptions: None.
11. Internal standards, criteria specified for ICP-MS analyses only, monitored at the instrument.
Exceptions: None.
12. Any calibration using more than two-points produced a correlation coefficient equal to or greater than 0.995.
Exceptions: None.

Acronyms and Definitions:

ESAT	Environmental Services Assistance Team
J	Data Estimated qualifier (also applied to all data less than PQL, greater than or equal to MDL)
MDL	Method Detection Limit
PQL	Practical Quantitation Limit, also known as reporting limit.
RPD	Relative Percent Difference (difference divided by the mean)
%D	Percent difference, serial dilution criteria unit, difference divided by the original result
%R	Percent recovery, analyzed (less sample contribution) divided by true value
<	Analyte NOT DETECTED at or above the Method Detection Limit(MDL)
mg/L	Parts per million (milligrams per liter). Solids equivalent = mg/Kg.
ug/L	Parts per billion (micrograms per liter). Solids equivalent = ug/Kg.
NR	No Recovery (matrix spike) - Often seen for calcium/magnesium when their concentration exceeds the spike level by > 4x.
NFGI	USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review/October 2004
RE	Sample Re-analysis. Usually seen on raw data and sequences for required sample dilutions due to over-range analytes.
U	Analyte not detected at or above MDL qualifier
D	Diluted value qualifier.

Method(s) Summary :

As defined in the Technical Direction Form (TDF), some or all of the methods listed below were used for the determination of the reported target analytes.

From EPA's *Methods for the Determination of Metals in Environmental Samples and/or total recoverable metals* were determined by:

- Method 200.7 / 6010B using a PE Optima ICP -OE (ICP).
- Method 200.8 / 6020 using a Perkin -Elmer Elan 6000 ICP -MS.
- Method 200.2 for total recoverable metals (only) digestion.
- Method 245.1 using a Perkin -Elmer FIM SCV AA (aqueous mercury only).

From *Standard Methods for the Examination of Water and Wastewater*, 18th Edition, 1992, Method 2340B was used for the calculated hardness determination. Hardness is reported as mg (milligram) equivalent CaCO₃ per liter (L) determined as follows:

$$\text{Calculated hardness} = 2.497 * (\text{Calcium, mg/L}) + 4.118 * (\text{Magnesium, mg/L}).$$

From *EPA's Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW -846 ,

- Method 3015A was used for microwave assisted total metals digestion.
- Method 747-3 was used for mercury in solids .

From EPA's *Determination of Inorganic Anions by Ion Chromatography*, Revision 2.1, 1993, Method 300.0 was used to determine the anions.

From EPA's *Chemical Analysis of Water and Wastes*, March 1983:

- Method 310.1 was followed for the alkalinity determination.
- Method 160.1 was followed for gravimetric total dissolved solids (TDS) determination.
- Method 160.2 was used for gravimetric total suspended solids (TSS) determination.
- Method 415.3 was used for total organic carbon (TOC) determination using either an Apollo 9000 or Phoenix 8000 Non-Dispersive IR (N-DIR) system. Also known as dissolved organic carbon (DOC) when performed on the dissolved sample fraction.

The quality control procedures listed in the TDF request were utilized by ESAT to verify accuracy of the results and to evaluate any matrix interferences.

Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSE100 EPA Tag No:	Date / Time Sampled: Matrix: Sediment	08/11/15 10:00	Workorder: Lab Number:	C150804 C150804-01 A
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Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
7473	Mercury	0.01	J	mg/kg dry wt	0.01	1	08/13/2015	SW	1508091
EPA 200.2 / 200.8	Antimony	1010		ug/kg dry wt	501	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Arsenic	9740		ug/kg dry wt	501	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Barium	62800		ug/kg dry wt	501	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Cadmium	1270		ug/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Chromium	3440		ug/kg dry wt	1000	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Cobalt	7430		ug/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Copper	57000		ug/kg dry wt	501	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Lead	226000		ug/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Molybdenum	2720		ug/kg dry wt	1000	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Nickel	4680		ug/kg dry wt	501	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Selenium	< 2010	U	ug/kg dry wt	1000	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Silver	866	J	ug/kg dry wt	501	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Thallium	1910		ug/kg dry wt	501	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Vanadium	11000		ug/kg dry wt	2010	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Aluminum	4310		mg/kg dry wt	10.0	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Beryllium	< 5.01	U	mg/kg dry wt	1.00	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Calcium	1870		mg/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Iron	15100		mg/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Magnesium	2400		mg/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Manganese	1410		mg/kg dry wt	2.01	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Potassium	492	J	mg/kg dry wt	251	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Sodium	< 1000	U	mg/kg dry wt	251	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Zinc	477		mg/kg dry wt	5.01	10	08/13/2015	SV	1508086

Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSE101 EPA Tag No:	Date / Time Sampled: Matrix: Sediment	08/11/15 10:19	Workorder: C150804 Lab Number: C150804-02 A
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Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
7473	Mercury	0.02		mg/kg dry wt	0.01	1	08/13/2015	SW	1508091
EPA 200.2 / 200.8	Antimony	< 999	U	ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Arsenic	3690		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Barium	101000		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Cadmium	2460		ug/kg dry wt	99.9	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Chromium	7440		ug/kg dry wt	999	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Cobalt	8610		ug/kg dry wt	99.9	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Copper	37000		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Lead	86800		ug/kg dry wt	99.9	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Molybdenum	< 999	U	ug/kg dry wt	999	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Nickel	10500		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Selenium	< 2000	U	ug/kg dry wt	999	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Silver	< 999	U	ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Thallium	< 999	U	ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Vanadium	12900		ug/kg dry wt	2000	10	08/13/2015	SV	1508086
EPA 200.2 / 200.7	Aluminum	6450		mg/kg dry wt	9.99	10	08/13/2015	SV	1508086
EPA 200.2 / 200.7	Beryllium	< 5.00	U	mg/kg dry wt	0.999	10	08/13/2015	SV	1508086
EPA 200.2 / 200.7	Calcium	35000		mg/kg dry wt	99.9	10	08/13/2015	SV	1508086
EPA 200.2 / 200.7	Iron	10500		mg/kg dry wt	99.9	10	08/13/2015	SV	1508086
EPA 200.2 / 200.7	Magnesium	3850		mg/kg dry wt	99.9	10	08/13/2015	SV	1508086
EPA 200.2 / 200.7	Manganese	1300		mg/kg dry wt	2.00	10	08/13/2015	SV	1508086
EPA 200.2 / 200.7	Potassium	1380		mg/kg dry wt	250	10	08/13/2015	SV	1508086
EPA 200.2 / 200.7	Sodium	< 999	U	mg/kg dry wt	250	10	08/13/2015	SV	1508086
EPA 200.2 / 200.7	Zinc	727		mg/kg dry wt	5.00	10	08/13/2015	SV	1508086

Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSE102 EPA Tag No:	Date / Time Sampled: Matrix: Sediment	08/11/15 17:53	Workorder: Lab Number:	C150804 C150804-03 A
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Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
7473	Mercury	0.01	J	mg/kg dry wt	0.01	1	08/13/2015	SW	1508091
EPA 200.2 / 200.8	Antimony	508	J	ug/kg dry wt	497	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Arsenic	7910		ug/kg dry wt	497	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Barium	71700		ug/kg dry wt	497	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Cadmium	1960		ug/kg dry wt	99.4	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Chromium	3590		ug/kg dry wt	994	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Cobalt	10100		ug/kg dry wt	99.4	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Copper	36800		ug/kg dry wt	497	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Lead	165000		ug/kg dry wt	99.4	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Molybdenum	3640		ug/kg dry wt	994	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Nickel	6680		ug/kg dry wt	497	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Selenium	< 1990	U	ug/kg dry wt	994	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Silver	< 994	U	ug/kg dry wt	497	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Thallium	< 994	U	ug/kg dry wt	497	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Vanadium	10700		ug/kg dry wt	1990	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Aluminum	3720		mg/kg dry wt	9.94	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Beryllium	< 4.97	U	mg/kg dry wt	0.994	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Calcium	1400		mg/kg dry wt	99.4	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Iron	11700		mg/kg dry wt	99.4	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Magnesium	2260		mg/kg dry wt	99.4	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Manganese	2430		mg/kg dry wt	1.99	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Potassium	342	J	mg/kg dry wt	249	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Sodium	< 994	U	mg/kg dry wt	249	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Zinc	566		mg/kg dry wt	4.97	10	08/13/2015	SV	1508086

Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSE103 EPA Tag No:	Date / Time Sampled: Matrix: Sediment	08/11/15 10:57	Workorder: C150804 Lab Number: C150804-04 A
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Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
7473	Mercury	0.02		mg/kg dry wt	0.01	1	08/13/2015	SW	1508091
EPA 200.2 / 200.8	Antimony	1250		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Arsenic	8900		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Barium	104000		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Cadmium	2640		ug/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Chromium	3540		ug/kg dry wt	1000	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Cobalt	10300		ug/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Copper	59600		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Lead	208000		ug/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Molybdenum	2860		ug/kg dry wt	1000	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Nickel	6750		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Selenium	< 2000	U	ug/kg dry wt	1000	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Silver	905	J	ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Thallium	< 1000	U	ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Vanadium	10900		ug/kg dry wt	2000	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Aluminum	4390		mg/kg dry wt	10.0	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Beryllium	< 5.00	U	mg/kg dry wt	1.00	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Calcium	1860		mg/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Iron	14900		mg/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Magnesium	2400		mg/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Manganese	3180		mg/kg dry wt	2.00	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Potassium	479	J	mg/kg dry wt	250	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Sodium	< 1000	U	mg/kg dry wt	250	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Zinc	807		mg/kg dry wt	5.00	10	08/13/2015	SV	1508086

Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSE104 EPA Tag No:	Date / Time Sampled: Matrix: Sediment	08/11/15 11:35	Workorder: Lab Number:	C150804 C150804-05 A
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Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
7473	Mercury	0.01	J	mg/kg dry wt	0.01	1	08/13/2015	SW	1508091
EPA 200.2 / 200.8	Antimony	1350		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Arsenic	10500		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Barium	71500		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Cadmium	1900		ug/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Chromium	3750		ug/kg dry wt	1000	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Cobalt	7940		ug/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Copper	65700		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Lead	250000		ug/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Molybdenum	2220		ug/kg dry wt	1000	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Nickel	5210		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Selenium	< 2000	U	ug/kg dry wt	1000	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Silver	797	J	ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Thallium	< 1000	U	ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Vanadium	12200		ug/kg dry wt	2000	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Aluminum	4880		mg/kg dry wt	10.0	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Beryllium	< 5.00	U	mg/kg dry wt	1.00	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Calcium	2330		mg/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Iron	17600		mg/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Magnesium	2870		mg/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Manganese	2030		mg/kg dry wt	2.00	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Potassium	523	J	mg/kg dry wt	250	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Sodium	< 1000	U	mg/kg dry wt	250	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Zinc	643		mg/kg dry wt	5.00	10	08/13/2015	SV	1508086

Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSE105 EPA Tag No:	Date / Time Sampled: Matrix: Sediment	08/11/15 11:51	Workorder: C150804 Lab Number: C150804-06 A
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Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
7473	Mercury	0.02		mg/kg dry wt	0.01	1	08/13/2015	SW	1508091
EPA 200.2 / 200.8	Antimony	< 999	U	ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Arsenic	4480		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Barium	101000		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Cadmium	2950		ug/kg dry wt	99.9	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Chromium	6090		ug/kg dry wt	999	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Cobalt	10500		ug/kg dry wt	99.9	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Copper	44900		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Lead	105000		ug/kg dry wt	99.9	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Molybdenum	< 999	U	ug/kg dry wt	999	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Nickel	10000		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Selenium	< 2000	U	ug/kg dry wt	999	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Silver	580	J	ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Thallium	1740		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Vanadium	12600		ug/kg dry wt	2000	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Aluminum	6370		mg/kg dry wt	9.99	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Beryllium	< 5.00	U	mg/kg dry wt	0.999	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Calcium	17500		mg/kg dry wt	99.9	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Iron	11700		mg/kg dry wt	99.9	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Magnesium	3540		mg/kg dry wt	99.9	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Manganese	2050		mg/kg dry wt	2.00	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Potassium	1140		mg/kg dry wt	250	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Sodium	< 999	U	mg/kg dry wt	250	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Zinc	1020		mg/kg dry wt	5.00	10	08/13/2015	SV	1508086

Project Name: Upper Animas_SED 4_AUG 2015_A096

Certificate of Analysis

TDF #:

A-098

Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSE106 EPA Tag No:	Date / Time Sampled: Matrix: Sediment	08/11/15 14:15	Workorder: C150804 Lab Number: C150804-07 A
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Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
7473	Mercury	0.02		mg/kg dry wt	0.01	1	08/13/2015	SW	1508091
EPA 200.2 / 200.8	Antimony	936	J	ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Arsenic	13500		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Barium	90700		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Cadmium	2350		ug/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Chromium	4430		ug/kg dry wt	1000	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Cobalt	8480		ug/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Copper	74000		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Lead	232000		ug/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Molybdenum	2280		ug/kg dry wt	1000	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Nickel	6090		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Selenium	< 2000	U	ug/kg dry wt	1000	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Silver	1120		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Thallium	< 1000	U	ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Vanadium	13800		ug/kg dry wt	2000	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Aluminum	5650		mg/kg dry wt	10.0	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Beryllium	< 5.00	U	mg/kg dry wt	1.00	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Calcium	3050		mg/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Iron	19200		mg/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Magnesium	3250		mg/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Manganese	1580		mg/kg dry wt	2.00	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Potassium	601	J	mg/kg dry wt	250	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Sodium	< 1000	U	mg/kg dry wt	250	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Zinc	796		mg/kg dry wt	5.00	10	08/13/2015	SV	1508086

Project Name: Upper Animas_SED 4_AUG 2015_A096

Certificate of Analysis

TDF #:

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Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSE107 EPA Tag No:	Date / Time Sampled: Matrix: Sediment	08/11/15 14:40	Workorder: C150804 Lab Number: C150804-08 A
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Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
7473	Mercury	0.03		mg/kg dry wt	0.01	1	08/13/2015	SW	1508091
EPA 200.2 / 200.8	Antimony	< 1000	U	ug/kg dry wt	501	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Arsenic	9310		ug/kg dry wt	501	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Barium	167000		ug/kg dry wt	501	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Cadmium	3580		ug/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Chromium	6180		ug/kg dry wt	1000	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Cobalt	13500		ug/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Copper	61600		ug/kg dry wt	501	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Lead	124000		ug/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Molybdenum	1080		ug/kg dry wt	1000	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Nickel	11600		ug/kg dry wt	501	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Selenium	< 2000	U	ug/kg dry wt	1000	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Silver	689	J	ug/kg dry wt	501	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Thallium	< 1000	U	ug/kg dry wt	501	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Vanadium	14500		ug/kg dry wt	2000	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Aluminum	7470		mg/kg dry wt	10.0	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Beryllium	< 5.01	U	mg/kg dry wt	1.00	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Calcium	19600		mg/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Iron	16300		mg/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Magnesium	3530		mg/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Manganese	2630		mg/kg dry wt	2.00	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Potassium	1130		mg/kg dry wt	250	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Sodium	< 1000	U	mg/kg dry wt	250	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Zinc	1290		mg/kg dry wt	5.01	10	08/13/2015	SV	1508086

Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSE108 EPA Tag No:	Date / Time Sampled: Matrix: Sediment	08/11/15 12:20	Workorder: C150804 Lab Number: C150804-09 A
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Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
7473	Mercury	0.05		mg/kg dry wt	0.01	1	08/13/2015	SW	1508091
EPA 200.2 / 200.8	Antimony	3300		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Arsenic	21700		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Barium	128000		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Cadmium	2080		ug/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Chromium	4090		ug/kg dry wt	1000	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Cobalt	10700		ug/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Copper	118000		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Lead	496000		ug/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Molybdenum	7240		ug/kg dry wt	1000	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Nickel	6480		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Selenium	1340	J	ug/kg dry wt	1000	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Silver	2760		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Thallium	< 1000	U	ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Vanadium	19600		ug/kg dry wt	2000	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Aluminum	6310		mg/kg dry wt	10.0	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Beryllium	< 5.00	U	mg/kg dry wt	1.00	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Calcium	2730		mg/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Iron	34700		mg/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Magnesium	3210		mg/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Manganese	2180		mg/kg dry wt	2.00	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Potassium	718	J	mg/kg dry wt	250	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Sodium	< 1000	U	mg/kg dry wt	250	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Zinc	738		mg/kg dry wt	5.00	10	08/13/2015	SV	1508086

Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSE109 EPA Tag No:	Date / Time Sampled: Matrix: Sediment	08/11/15 13:00	Workorder: Lab Number:	C150804 C150804-10 A
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Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
7473	Mercury	0.01	J	mg/kg dry wt	0.01	1	08/13/2015	SW	1508091
EPA 200.2 / 200.8	Antimony	1230		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Arsenic	12300		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Barium	103000		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Cadmium	3130		ug/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Chromium	5150		ug/kg dry wt	1000	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Cobalt	15700		ug/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Copper	82900		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Lead	276000		ug/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Molybdenum	2900		ug/kg dry wt	1000	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Nickel	9370		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Selenium	< 2000	U	ug/kg dry wt	1000	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Silver	1050		ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Thallium	< 1000	U	ug/kg dry wt	500	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Vanadium	13900		ug/kg dry wt	2000	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Aluminum	6240		mg/kg dry wt	10.0	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Beryllium	< 5.00	U	mg/kg dry wt	1.00	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Calcium	5460		mg/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Iron	22800		mg/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Magnesium	3800		mg/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Manganese	3650		mg/kg dry wt	2.00	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Potassium	615	J	mg/kg dry wt	250	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Sodium	< 1000	U	mg/kg dry wt	250	10	08/13/2015	SV	1508086
EPA 200.2/200.7	Zinc	1360		mg/kg dry wt	5.00	10	08/13/2015	SV	1508086

Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSE110 EPA Tag No:	Date / Time Sampled: Matrix: Sediment	08/11/15 13:30	Workorder: Lab Number:	C150804 C150804-11 A
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Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
7473	Mercury	0.01	J	mg/kg dry wt	0.01	1	08/13/2015	SW	1508091
EPA 200.2 / 200.8	Antimony	617	J	ug/kg dry wt	502	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Arsenic	8090		ug/kg dry wt	502	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Barium	58300		ug/kg dry wt	502	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Cadmium	1980		ug/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Chromium	2530		ug/kg dry wt	1000	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Cobalt	9300		ug/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Copper	65700		ug/kg dry wt	502	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Lead	203000		ug/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Molybdenum	2130		ug/kg dry wt	1000	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Nickel	5620		ug/kg dry wt	502	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Selenium	< 2010	U	ug/kg dry wt	1000	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Silver	< 1000	U	ug/kg dry wt	502	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Thallium	< 1000	U	ug/kg dry wt	502	10	08/13/2015	SV	1508086
EPA 200.2 / 200.8	Vanadium	10400		ug/kg dry wt	2010	10	08/13/2015	SV	1508086
EPA 200.2 / 200.7	Aluminum	4720		mg/kg dry wt	10.0	10	08/13/2015	SV	1508086
EPA 200.2 / 200.7	Beryllium	< 5.02	U	mg/kg dry wt	1.00	10	08/13/2015	SV	1508086
EPA 200.2 / 200.7	Calcium	1510		mg/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2 / 200.7	Iron	16400		mg/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2 / 200.7	Magnesium	2700		mg/kg dry wt	100	10	08/13/2015	SV	1508086
EPA 200.2 / 200.7	Manganese	2130		mg/kg dry wt	2.01	10	08/13/2015	SV	1508086
EPA 200.2 / 200.7	Potassium	418	J	mg/kg dry wt	251	10	08/13/2015	SV	1508086
EPA 200.2 / 200.7	Sodium	< 1000	U	mg/kg dry wt	251	10	08/13/2015	SV	1508086
EPA 200.2 / 200.7	Zinc	659		mg/kg dry wt	5.02	10	08/13/2015	SV	1508086

"J" Qualifier indicates an estimated value

Project Name: Upper Animas_SED 4_AUG 2015_A096

Certificate of Analysis

TDF #:

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Metals (Total Recov) by EPA 200/7000 Series Methods - Quality Control

TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	%R	%R Limits	%D or RPD	%D or RPD Limit	
ICPMS-PE DRC-II										
Batch 1508086 - 200.2 - TR Metals			<i>Solid (dry wt basis)</i>							
ICPMS-PE DRC-II										
Method Blank (1508086-BLK2)		Dilution Factor: 5			Prepared: 08/12/15 Analyzed: 08/13/15					
Vanadium	< 1000	1500	ug/kg dry wt							
Chromium	< 500	1000	"							
Cobalt	< 50.0	100	"							
Nickel	< 250	500	"							
Copper	< 250	500	"							
Arsenic	285.9	1000	"							
Selenium	< 500	1000	"							
Molybdenum	< 500	500	"							
Silver	< 250	500	"							
Cadmium	< 50.0	100	"							
Antimony	< 250	500	"							
Barium	< 250	500	"							
Thallium	< 250	500	"							
Lead	< 50.0	100	"							
Duplicate (1508086-DUP2)		Dilution Factor: 1	Source: C150804-02			Prepared: 08/12/15 Analyzed: 08/13/15				
Vanadium	11590	3000	ug/kg dry wt	12940		11	35			
Chromium	6676	2000	"	7441		11	35			
Cobalt	8285	200	"	8609		4	35			
Nickel	9791	1000	"	10480		7	35			
Copper	38370	1000	"	36980		4	35			
Arsenic	3981	2000	"	3691		8	35			
Selenium	< 1000	2000	"	< 1000			35			
Molybdenum	< 1000	1000	"	< 1000			35			
Silver	< 501	1000	"	< 501			35			
Cadmium	2350	200	"	2462		5	35			
Antimony	< 501	1000	"	< 501			35			
Barium	104500	1000	"	101400		3	35			
Thallium	< 501	1000	"	< 501			35			
Lead	86260	200	"	86760		0.6	35			

Metals (Total Recov) by EPA 200/7000 Series Methods - Quality Control

TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	%R %R	%D or RPD	%D or RPD Limit
Batch 1508086 - 200.2 - TR Metals		<i>Solid (dry wt basis)</i>						ICPMS-PE DRC-II
Matrix Spike (1508086-MS2)		Dilution Factor: 1	Source: C150804-02			Prepared: 08/12/15 Analyzed: 08/13/15		
Vanadium	37480	2990	ug/kg dry wt	29900	12940	82	70-130	
Chromium	41580	2000	"	39900	7441	86	70-130	
Cobalt	25930	200	"	20000	8609	87	70-130	
Nickel	53780	998	"	49900	10480	87	70-130	
Copper	63440	998	"	29900	36980	88	70-130	
Arsenic	76910	2000	"	79800	3691	92	70-130	
Selenium	183200	2000	"	200000	< 998	92	70-130	
Molybdenum	34630	998	"	39900	< 998	87	70-130	
Silver	7534	998	"	7490	< 499	101	70-130	
Cadmium	20900	200	"	20000	2462	92	70-130	
Antimony	45920	998	"	79800	< 499	58	70-130	
Barium	117900	998	"	20000	101400	83	70-130	
Thallium	187300	998	"	200000	< 499	94	70-130	
Lead	179800	200	"	99800	86760	93	70-130	
Matrix Spike (1508086-MS4)		Dilution Factor: 1	Source: C150804-06			Prepared: 08/12/15 Analyzed: 08/13/15		
Vanadium	39040	3000	ug/kg dry wt	30000	12600	88	70-130	
Chromium	41140	2000	"	40000	6092	88	70-130	
Cobalt	29190	200	"	20000	10510	93	70-130	
Nickel	56120	1000	"	50000	9998	92	70-130	
Copper	73110	1000	"	30000	44940	94	70-130	
Arsenic	77900	2000	"	80100	4477	92	70-130	
Selenium	183900	2000	"	200000	< 1000	92	70-130	
Molybdenum	35870	1000	"	40000	< 1000	90	70-130	
Silver	7719	1000	"	7510	579.7	95	70-130	
Cadmium	21700	200	"	20000	2946	94	70-130	
Antimony	49140	1000	"	80100	< 500	61	70-130	
Barium	120100	1000	"	20000	101400	93	70-130	
Thallium	186400	1000	"	200000	1741	92	70-130	
Lead	211200	200	"	100000	105400	106	70-130	

Project Name: Upper Animas_SED 4_AUG 2015_A096

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Metals (Total Recov) by EPA 200/7000 Series Methods - Quality Control

TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	%R %R	%D or RPD	%D or RPD Limit
Batch 1508086 - 200.2 - TR Metals		<i>Solid (dry wt basis)</i>						ICPMS-PE DRC-II
Reference (1508086-SRM2)		Dilution Factor: 2						Prepared: 08/12/15 Analyzed: 08/13/15
Vanadium	67070	11900	ug/kg dry wt	65800		102	80-120	
Chromium	102600	7950	"	96500		106	80-120	
Cobalt	145900	795	"	140000		104	80-120	
Nickel	57280	3980	"	56800		101	76.5-123.4	
Copper	6374000	3980	"	6680000		95	80-120	
Arsenic	917100	7950	"	930000		99	65-134	
Selenium	37420	7950	"	37000		101	48-152	
Silver	19300	3980	"	20900		92	64-136	
Cadmium	44910	795	"	41600		108	77-123	
Antimony	257300	3980	"	213000		121	61-139	
Barium	5794	3980	"	5300		109	48-152	
Thallium	35930	3980	"	38100		94	64.5-135	
Lead	212200	795	"	224000		95	75-125	
Batch 1508094 - 1508086		<i>Solid (dry wt basis)</i>						ICPMS-PE DRC-II
Serial Dilution (1508094-SRD1)		Dilution Factor: 5		Source: C150804-02		Prepared: 08/12/15 Analyzed: 08/13/15		
Vanadium	13250	15000	ug/kg dry wt	12940		2	10	
Chromium	7529	9990	"	7441		1	10	
Cobalt	8900	999	"	8609		3	10	
Nickel	10370	5000	"	10480		1	10	
Copper	39310	5000	"	36980		6	10	
Arsenic	4493	9990	"	3691		20	10	
Selenium	< 5000	9990	"	< 1,000.00			10	
Molybdenum	< 5000	5000	"	< 1,000.00			10	
Silver	< 2500	5000	"	< 500.00			10	
Cadmium	2244	999	"	2462		9	10	
Antimony	< 2500	5000	"	< 500.00			10	
Barium	100900	5000	"	101400		0.4	10	
Thallium	< 2500	5000	"	< 500.00			10	
Lead	86330	999	"	86760		0.5	10	

Metals (Total Recov) by EPA 200/7000 Series Methods - Quality Control

TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	%R %R	%R Limits	%D or RPD	%D or RPD Limit
ICPOE - PE Optima									
Batch 1508086 - 200.2 - TR Metals		Solid (dry wt basis)							ICPOE - PE Optima
Method Blank (1508086-BLK1)		Dilution Factor: 1							Prepared: 08/12/15 Analyzed: 08/13/15
Aluminum	< 1.00	5.00	mg/kg dry wt						
Beryllium	< 0.100	0.500	"						
Calcium	< 10.0	25.0	"						
Iron	< 10.0	25.0	"						
Potassium	< 25.0	100	"						
Magnesium	< 10.0	25.0	"						
Manganese	1.5895	0.500	"						
Sodium	< 25.0	100	"						
Zinc	1.6054	2.00	"						
Duplicate (1508086-DUP1)		Dilution Factor: 1							Prepared: 08/12/15 Analyzed: 08/13/15
Aluminum	6057.2	50.1	mg/kg dry wt	6449.1		6	35		
Beryllium	< 1.00	5.01	"	< 1.00					
Calcium	33314	250	"	35044		5	35		
Iron	9756.2	250	"	10546		8	35		
Potassium	1264.2	1000	"	1377.9		9	35		
Magnesium	3432.4	250	"	3848.7		11	35		
Manganese	1264.2	5.01	"	1303.4		3	35		
Sodium	< 250	1000	"	< 250					
Zinc	746.53	20.0	"	727.09		3	35		
Matrix Spike (1508086-MS1)		Dilution Factor: 1							Prepared: 08/12/15 Analyzed: 08/13/15
Aluminum	6661.8	49.9	mg/kg dry wt	200	6449.1	107	70-130		
Beryllium	20.503	4.99	"	20.0	< 0.998	103	70-130		
Calcium	32588	250	"	99.8	35044	NR	70-130		
Iron	10361	250	"	299	10546	NR	70-130		
Potassium	2132.4	998	"	998	1377.9	76	70-130		
Magnesium	3788.6	250	"	200	3848.7	NR	70-130		
Manganese	1216.1	4.99	"	20.0	1303.4	NR	70-130		
Sodium	312.70	998	"	299	< 250	104	70-130		
Zinc	727.12	20.0	"	20.0	727.09	0.1	70-130		

Metals (Total Recov) by EPA 200/7000 Series Methods - Quality Control

TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	%R %R	%D or RPD	%D or RPD Limit
Batch 1508086 - 200.2 - TR Metals		<i>Solid (dry wt basis)</i>						ICPOE - PE Optima
Matrix Spike (1508086-MS3)		Dilution Factor: 1	Source: C150804-06			Prepared: 08/12/15 Analyzed: 08/13/15		
Aluminum	7172.8	50.0	mg/kg dry wt	200	6370.4	401	70-130	
Beryllium	20.489	5.00	"	20.0	< 1.00	102	70-130	
Calcium	16046	250	"	100	17542	NR	70-130	
Iron	12096	250	"	300	11713	128	70-130	
Potassium	2113.4	1000	"	1000	1138.6	97	70-130	
Magnesium	3988.1	250	"	200	3542.8	222	70-130	
Manganese	2146.3	5.00	"	20.0	2050.7	478	70-130	
Sodium	327.31	1000	"	300	< 250	109	70-130	
Zinc	1095.4	20.0	"	20.0	1020.8	373	70-130	
Reference (1508086-SRM1)		Dilution Factor: 5				Prepared: 08/12/15 Analyzed: 08/13/15		
Aluminum	234.27	49.7	mg/kg dry wt	309	76	63-137		
Beryllium	20.131	4.97	"	18.8	107	82-118		
Calcium	186250	249	"	184000	101	78-122		
Iron	20668	249	"	21000	98	80-120		
Potassium	< 249	994	"	102		0-370		
Magnesium	105010	249	"	113000	93	80-120		
Manganese	222.93	4.97	"	201	111	80-120		
Sodium	< 249	994	"	92.8		0-299		
Zinc	193.21	19.9	"	175	110	73-127		
Batch 1508093 - 1508086		<i>Solid (dry wt basis)</i>						ICPOE - PE Optima
Serial Dilution (1508093-SRD1)		Dilution Factor: 5	Source: C150804-02			Prepared: 08/12/15 Analyzed: 08/13/15		
Aluminum	6361.3	250	mg/kg dry wt	6449.1		1	10	
Beryllium	< 5.00	25.0	"	< 1.00			10	
Calcium	34638	1250	"	35044		1	10	
Iron	10709	1250	"	10546		2	10	
Potassium	1322.8	5000	"	1377.9		4	10	
Magnesium	3983.2	1250	"	3848.7		3	10	
Manganese	1343.6	25.0	"	1303.4		3	10	
Sodium	< 1250	5000	"	< 250.00			10	
Zinc	751.58	99.9	"	727.09		3	10	

Metals (Total Recov) by EPA 200/7000 Series Methods - Quality Control

TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	%R %R	%R Limits	%D or RPD	%D or RPD Limit
NIC MA-3000									
Batch 1508091 - No Lab Prep Reqd			Solid (dry wt basis)						
Method Blank (1508091-BLK1)			Dilution Factor: 1						
Mercury	< 0.01	0.02	mg/kg dry wt						
Duplicate (1508091-DUP1)			Dilution Factor: 1	Source: C150804-02			Prepared & Analyzed: 08/13/15		
Mercury	0.02	0.02	mg/kg dry wt	0.02			0.9		35
Matrix Spike (1508091-MS1)			Dilution Factor: 1	Source: C150804-02			Prepared & Analyzed: 08/13/15		
Mercury	0.23	0.02	mg/kg dry wt	0.200	0.02	106	80-120		
Matrix Spike Dup (1508091-MSD1)			Dilution Factor: 1	Source: C150804-02			Prepared & Analyzed: 08/13/15		
Mercury	0.23	0.02	mg/kg dry wt	0.200	0.02	105	80-120	0.9	20
Reference (1508091-SRM1)			Dilution Factor: 1	Prepared & Analyzed: 08/13/15					
Mercury	6.86	0.22	mg/kg dry wt	6.45		106	75-125		

NOTE: %R = % Recovery, %R limits do not apply when sample levels exceed 4x the spike level.
 RPD = Relative Percent Difference %D = % Difference, DL = Detection Limit for QC sample

TechLaw Inc, ESAT Region8
INORGANIC ANALYSES DATA SHEET
Initial and Continuing Calibration Blanks

Analytical Method: EPA 200.2/200.7Analysis Name: ICPOE Tot. Rec. MetalsInstrument: ICPOE - PE OptimaWork Order. Nu: C150804Analytical Sequence: 1508093 Total RecoverableConcentration Units: mg/kg dry wt

Blank criteria = +/- 5x analyte MDL (+/- PQL)

Analyte	Initial Calibration Blank (1 & 2)	Continuing Calibration Blanks				Method Blank (Batch ID)		PQL
		1	2	3	4	1508086-BLK1	NA	
Aluminum	-1.93	4.84	6.57			5.34	NA	5.00
		5	6	7	8			
	0.44	1	2	3	4	-0.07	NA	0.50
		0.00	0.16					
Beryllium	0.44	5	6	7	8	32.54	NA	25.00
	-11.51	1	2	3	4	1508086-BLK1	NA	25.00
		-6.82	-17.92					
Calcium	-11.51	5	6	7	8	32.54	NA	25.00
	-14.02	1	2	3	4	1508086-BLK1	NA	25.00
		-2.69	5.04					
Iron	-14.02	5	6	7	8	58.39	NA	25.00
	3.02	1	2	3	4	1508086-BLK1	NA	100.00
		21.09	16.41					
Potassium	3.02	5	6	7	8	23.58	NA	100.00
	-6.90	1	2	3	4	1508086-BLK1	NA	25.00
		-0.62	-1.86					
Magnesium	-6.90	5	6	7	8	16.90	NA	25.00
	0.68	1	2	3	4	1508086-BLK1	NA	0.50
		0.90	2.17					
Manganese	0.68	5	6	7	8	15.89	NA	0.50
	2.34	1	2	3	4	1508086-BLK1	NA	100.00
		0.83	2.41					
Sodium	2.34	5	6	7	8	49.44	NA	100.00

Project Name: Upper Animas_SED 4_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

TechLaw Inc, ESAT Region8

INORGANIC ANALYSES DATA SHEET**Initial and Continuing Calibration Blanks**Analytical Method: EPA 200.2/200.7Analysis Name: ICPOE Tot. Rec. MetalsInstrument: ICPOE - PE OptimaWork Order Nu: C150804Analytical Sequence: 1508093 Total RecoverableConcentration Units: mg/kg dry wt

Blank criteria = +/- 5x analyte MDL (+/- PQL)

Analyte	Initial Calibration Blank (1 & 2)	Continuing Calibration Blanks				Method Blank (Batch ID)		PQL
		1	2	3	4	1508086-BLK1	NA	
Zinc	-2.57	2.74	-4.33			16.05	NA	2.00
		5	6	7	8			

TechLaw Inc, ESAT Region8

INORGANIC ANALYSES DATA SHEET

Initial and Continuing Calibration Blanks

Analytical Method: EPA 200.2 / 200.8Analysis Name: ICPMS Tot. Rec. MetalsInstrument: ICPMS-PE DRC-IIWork Order Nu: C150804Analytical Sequence: 1508094 Total RecoverableConcentration Units: ug/kg dry wt

Blank criteria = +/- 5x analyte MDL (+/- PQL)

Analyte	Initial Calibration Blank (1 & 2)	Continuing Calibration Blanks				Method Blank (Batch ID)	PQL	
		1	2	3	4	NA	1508086-BLK2	
Vanadium	-0.02	1	2	3	4	NA	1508086-BLK2	
		0.03	0.03			NA	0.02	300.00
		5	6	7	8			
Chromium	-0.13	1	2	3	4	NA	1508086-BLK2	
		-0.04	-0.08			NA	0.49	200.00
		5	6	7	8			
Cobalt	0.01	1	2	3	4	NA	1508086-BLK2	
		0.02	0.03			NA	-0.01	20.00
		5	6	7	8			
Nickel	0.05	1	2	3	4	NA	1508086-BLK2	
		0.05	0.04			NA	0.00	100.00
		5	6	7	8			
Copper	0.02	1	2	3	4	NA	1508086-BLK2	
		-0.03	0.03			NA	-0.05	100.00
		5	6	7	8			
Arsenic	0.18	1	2	3	4	NA	1508086-BLK2	
		0.04	0.17			NA	0.57	200.00
		5	6	7	8			
Selenium	0.39	1	2	3	4	NA	1508086-BLK2	
		0.48	0.39			NA	0.19	200.00
		5	6	7	8			
Molybdenum	0.05	1	2	3	4	NA	1508086-BLK2	
		0.06	0.05			NA	0.13	100.00
		5	6	7	8			

TechLaw Inc, ESAT Region8

INORGANIC ANALYSES DATA SHEET

Initial and Continuing Calibration Blanks

Analytical Method: EPA 200.2 / 200.8

Analysis Name:

ICPMS Tot. Rec. MetalsInstrument: ICPMS-PE DRC-II

Work Order Nu

C150804Analytical Sequence: 1508094 Total Recoverable

Concentration Units:

ug/kg dry wt

Blank criteria = +/- 5x analyte MDL (+/- PQL)

Analyte	Initial Calibration Blank (1 & 2)	Continuing Calibration Blanks				Method Blank (Batch ID)		PQL
		1	2	3	4	NA	1508086-BLK2	
Silver	0.02	1	2	3	4	NA	1508086-BLK2	
		0.04	0.04			NA	0.00	100.00
		5	6	7	8			
Cadmium	0.04	1	2	3	4	NA	1508086-BLK2	
		0.01	0.06			NA	0.00	20.00
		5	6	7	8			
Antimony	0.12	1	2	3	4	NA	1508086-BLK2	
		0.24	0.25			NA	0.01	100.00
		5	6	7	8			
Barium	0.01	1	2	3	4	NA	1508086-BLK2	
		0.01	0.05			NA	-0.02	100.00
		5	6	7	8			
Thallium	0.00	1	2	3	4	NA	1508086-BLK2	
		0.13	0.05			NA	-0.08	100.00
		5	6	7	8			
Lead	0.03	1	2	3	4	NA	1508086-BLK2	
		0.04	0.05			NA	-0.01	20.00
		5	6	7	8			

Project Name: Upper Animas_SED 4_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

TechLaw Inc, ESAT Region8

INORGANIC ANALYSES DATA SHEET**Initial and Continuing Calibration Blanks**Analytical Method: 7473Analysis Name: TM Mercury 7473Instrument: NIC MA-3000Work Order Nu: C150804Analytical Sequence: **Total**Concentration Units: mg/kg dry wt

Blank criteria = +/- 5x analyte MDL (+/- PQL)

Analyte	Initial Calibration Blank (1 & 2)	Continuing Calibration Blanks				Method Blank (Batch ID)		PQL
		1	2	3	4	1508091-BLK1	NA	
Mercury		0.19	0.69			0.57	NA	0.02
		5	6	7	8			

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

ICPOE - PE Optima

Method: EPA 200.2/200.7

Analysis Name: ICPOE Tot. Rec. Metals

Sequence: 1508093

Work Order: C150804

Units: mg/kg dry wt

Total Recoverable Analyte	Initial (ICV1, ICV2)			Continuing Calibration Verification Standards (CCVs)								
	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
Aluminum	12500	12078	96.6	1			2			3		
				12500	12211	97.7	12500	12330	98.6			
				4			5			6		
				7			8			9		
				1			2			3		
				500	521.21	104.2	500	519.46	103.9			
				4			5			6		
Beryllium	500	515.04	103.0									
				7			8			9		
				1			2			3		
				12500	12208	97.7	12500	12400	99.2			
				4			5			6		
				7			8			9		
Calcium	12500	12318	98.5	1			2			3		
				12500	12208	97.7	12500	12400	99.2			
				4			5			6		
				7			8			9		
				1			2			3		
				12500	12279	98.2	12500	12374	99.0			
				4			5			6		
Iron	12500	12370	99.0									
				7			8			9		
				1			2			3		
				12500	12279	98.2	12500	12374	99.0			
				4			5			6		
				7			8			9		
Magnesium	12500	12171	97.4	1			2			3		
				12500	12178	97.4	12500	12244	98.0			
				4			5			6		
				7			8			9		
				1			2			3		
				1000	1046.3	104.6	1000	1047.8	104.8			
				4			5			6		
Manganese	1000	1012.5	101.3									
				7			8			9		
				1			2			3		

TechLaw, Inc. - ESAT Region 8																		
Initial and Continuing Calibration Verification Results																		
ICPOE - PE Optima			Method: EPA 200.2/200.7			Analysis Name: ICPOE Tot. Rec. Metals												
Sequence: 1508093			Work Order: C150804				Units: mg/kg dry wt											
Total Recoverable Analyte																		
Initial (ICV1, ICV2)			Continuing Calibration Verification Standards (CCVs)															
True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R							
Potassium	25000 24065 96.3	1			2			3										
		25000 24263 97.1			25000 24138 96.6													
		4			5			6										
		7			8			9										
		1			2			3										
		12500 12204 97.6			12500 12073 96.6													
		4			5			6										
Sodium	12500 12050 96.4																	
		7			8			9										
		1			2			3										
		2500 2695.5 107.8			2500 2716.8 108.7													
		4			5			6										
		7			8			9										
Metals - ICV & CCV %R Criteria = 90 - 110%, Classical Chemistry %R Criteria -ICV = 90 - 110%R, CCV = 80 - 120%R.																		

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

ICPMS-PE DRC-II

Method: EPA 200.2 / 200.8

Analysis Name: ICPMS Tot. Rec. Metals

Sequence: 1508094

Work Order: C150804

Units: ug/kg dry wt

Total Recoverable Analyte	Initial (ICV1, ICV2)			Continuing Calibration Verification Standards (CCVs)								
	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
Antimony	50.0	50.0	100.0	1			2			3		
				50.0	49.7	99.4	50.0	50.3	100.6			
				4			5			6		
				7			8			9		
				1			2			3		
				50.0	50.2	100.4	50.0	50.6	101.2			
				4			5			6		
Arsenic	50.0	49.8	99.6									
				7			8			9		
				1			2			3		
				50.0	50.2	100.4	50.0	50.6	101.2			
				4			5			6		
				7			8			9		
Barium	50.0	48.8	97.6	1			2			3		
				50.0	50.1	100.2	50.0	50.6	101.2			
				4			5			6		
				7			8			9		
				1			2			3		
				50.0	49.4	98.8	50.0	49.4	98.8			
				4			5			6		
Cadmium	50.0	48.1	96.2									
				7			8			9		
				1			2			3		
				50.0	49.4	98.8	50.0	49.4	98.8			
				4			5			6		
				7			8			9		
Chromium	50.0	48.9	97.8	1			2			3		
				50.0	49.7	99.4	50.0	50.1	100.2			
				4			5			6		
				7			8			9		
				1			2			3		
				50.0	49.7	99.4	50.0	50.8	101.6			
				4			5			6		
Cobalt	50.0	50.6	101.2									
				7			8			9		
				1			2			3		
				50.0	49.7	99.4	50.0	50.8	101.6			

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

ICPMS-PE DRC-II

Method: EPA 200.2 / 200.8

Analysis Name: ICPMS Tot. Rec. Metals

Sequence: 1508094

Work Order: C150804

Units: ug/kg dry wt

Total Recoverable Analyte	Initial (ICV1, ICV2)			Continuing Calibration Verification Standards (CCVs)								
	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
Copper	50.0	49.7	99.4	1			2			3		
				50.0	49.4	98.8	50.0	50.3	100.6			
				4			5			6		
				7			8			9		
				1			2			3		
				50.0	50.2	100.4	50.0	50.9	101.8			
				4			5			6		
Lead	50.0	49.9	99.8									
				7			8			9		
				1			2			3		
				50.0	50.3	100.6	50.0	50.6	101.2			
				4			5			6		
				7			8			9		
Molybdenum	50.0	49.0	98.0	1			2			3		
				50.0	50.3	100.6	50.0	50.6	101.2			
				4			5			6		
				7			8			9		
				1			2			3		
				50.0	51.2	102.4	50.0	51.2	102.4			
				4			5			6		
Nickel	50.0	50.6	101.2									
				7			8			9		
				1			2			3		
				50.0	51.2	102.4	50.0	51.2	102.4			
				4			5			6		
				7			8			9		
Selenium	50.0	50.5	101.0	1			2			3		
				50.0	50.5	101.0	50.0	52.0	104.0			
				4			5			6		
				7			8			9		
				1			2			3		
				50.0	51.4	102.8	50.0	51.1	102.2			
				4			5			6		
Silver	50.0	50.1	100.2									
				7			8			9		
				1			2			3		
				50.0	51.4	102.8	50.0	51.1	102.2			

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

ICPMS-PE DRC-II

Method: EPA 200.2 / 200.8

Analysis Name: ICPMS Tot. Rec. Metals

Sequence: 1508094

Work Order: C150804

Units: ug/kg dry wt

Total Recoverable Analyte	Initial (ICV1, ICV2)			Continuing Calibration Verification Standards (CCVs)								
	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
Thallium	50.0	50.0	100.0	1			2			3		
				50.0	50.1	100.2	50.0	50.5	101.0			
				4			5			6		
				7			8			9		
				1			2			3		
				50.0	50.1	100.2	50.0	50.7	101.4			
				4			5			6		
				7			8			9		

Metals - ICV & CCV %R Criteria = 90 - 110%, Classical Chemistry %R Criteria -ICV = 90 - 110%R, CCV = 80 - 120%R.

TechLaw, Inc. - ESAT Region 8**Initial and Continuing Calibration Verification Results**

NIC MA-3000

Method: 7473

Analysis Name: TM_Mercury 7473

Sequence: 1508095

Work Order: C150804

Units: mg/kg dry wt

Total Analyte	Initial (ICV1, ICV2)			Continuing Calibration Verification Standards (CCVs)								
	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
Mercury	100	108.1	108.1	1			2			3		
				100	93.79	93.8	100	95.30	95.3	100	105.9	105.9
				4			5			6		
				7			8			9		

Metals - ICV & CCV %R Criteria = 90 - 110%, Classical Chemistry %R Criteria -ICV = 90 - 110%R, CCV = 80 - 120%R.

TechLaw, Inc. - ESAT Region 8
ICP Interference Check Sample
ICPMS-PE DRC-II

<u>Analyte</u>	<u>Check Sample</u>	<u>Result*</u>	<u>Units</u>	<u>True</u>	<u>%R</u>	<u>PQL</u>
Sequence: 1508094	Analysis: ICPMS Tot. Rec. Metals					
Antimony	IFA1	0.0	ug/L			1.0
	IFB1	0.0	ug/L			1.0
Arsenic	IFA1	0.3	ug/L			2.0
	IFB1	19.7	ug/L	20	99	2.0
Barium	IFA1	0.1	ug/L			1.0
	IFB1	0.2	ug/L			1.0
Cadmium	IFA1	0.0	ug/L			0.2
	IFB1	20.3	ug/L	20	102	0.2
Chromium	IFA1	0.1	ug/L			2.0
	IFB1	20.4	ug/L	20	102	2.0
Cobalt	IFA1	0.0	ug/L			0.2
	IFB1	20.5	ug/L	20	103	0.2
Copper	IFA1	0.7	ug/L			1.0
	IFB1	20.7	ug/L	20	103	1.0
Lead	IFA1	0.0	ug/L			0.2
	IFB1	0.0	ug/L			0.2
Molybdenum	IFA1	200.0	ug/L	200	100	1.0
	IFB1	197.6	ug/L	200	99	1.0
Nickel	IFA1	-0.2	ug/L			1.0
	IFB1	20.3	ug/L	20	102	1.0
Selenium	IFA1	0.2	ug/L			2.0
	IFB1	-0.1	ug/L			2.0
Silver	IFA1	0.0	ug/L			1.0
	IFB1	19.7	ug/L	20	99	1.0
Thallium	IFA1	-0.1	ug/L			1.0
	IFB1	-0.1	ug/L			1.0
Vanadium	IFA1	0.1	ug/L			3.0
	IFB1	-0.2	ug/L			3.0

*Criteria = 80-120%R of True Value or +/- PQL

See raw data for complete analyte list and results.

TechLaw, Inc. - ESAT Region 8
ICP Interference Check Sample
ICPOE - PE Optima

<u>Analyte</u>	<u>Check Sample</u>	<u>Result*</u>	<u>Units</u>	<u>True</u>	<u>%R</u>	<u>PQL</u>
Sequence: 1508093	Analysis: ICPOE Tot. Rec. Metals					
Aluminum	IFA1	61,033.3	ug/L	60,000	102	50.0
	IFB1	60,989.5	ug/L	60,000	102	50.0
Beryllium	IFA1	0.2	ug/L			5.00
	IFB1	100.5	ug/L	100	100	5.00
Calcium	IFA1	314,618.2	ug/L	300,000	105	250
	IFB1	317,184.8	ug/L	300,000	106	250
Iron	IFA1	237,403.6	ug/L	250,000	95	250
	IFB1	238,813.0	ug/L	250,000	96	250
Magnesium	IFA1	142,530.4	ug/L	150,000	95	250
	IFB1	143,223.9	ug/L	150,000	95	250
Manganese	IFA1	0.0	ug/L			5.00
	IFB1	196.0	ug/L	200	98	5.00
Potassium	IFA1	-487.8	ug/L			1000
	IFB1	19,865.8	ug/L	20,000	99	1000
Sodium	IFA1	49,848.4	ug/L	50,000	100	1000
	IFB1	49,345.6	ug/L	50,000	99	1000
Zinc	IFA1	-13.4	ug/L			20.0
	IFB1	314.5	ug/L	300	105	20.0

*Criteria = 80-120%R of True Value or +/- PQL

See raw data for complete analyte list and results.

TDF #: A-098

TechLaw, Inc. - ESAT Region 8
Detection Limit (PQL) Standard
NIC MA-3000

Metals (Total Recov) by EPA 200/7000 Series Methods

Sequence: 1508095

<u>Analyte</u>	<u>True</u>	<u>Found</u>	<u>%R</u>	<u>Units</u>
Mercury	100	10.38	10	ug/L

Recovery Control Limits: 70-130% except Pb, Tl, Sb, & Hg at 50-150%. No limits for Al, Ca, Fe, K, Mg & Na.

TechLaw, Inc. - ESAT Region 8
Detection Limit (PQL) Standard
ICPMS-PE DRC-II

Metals (Total Recov) by EPA 200/7000 Series Methods

Sequence: 1508094

Analyte	True	Found	%R	Units
Antimony	1.00	1.0	101	ug/L
Arsenic	2.00	2.4	120	ug/L
Barium	10.0	9.4	94	ug/L
Cadmium	0.200	0.2	99	ug/L
Chromium	2.00	2.0	100	ug/L
Cobalt	0.200	0.2	90	ug/L
Copper	1.00	1.0	96	ug/L
Lead	0.200	0.2	86	ug/L
Molybdenum	1.00	0.9	91	ug/L
Nickel	1.00	1.0	98	ug/L
Selenium	2.00	1.8	90	ug/L
Silver	1.00	1.0	98	ug/L
Thallium	1.00	0.8	84	ug/L
Vanadium	2.00	2.0	100	ug/L

Recovery Control Limits: 70-130% except Pb, Tl, Sb, & Hg at 50-150%. No limits for Al, Ca, Fe, K, Mg & Na.

TechLaw, Inc. - ESAT Region 8
Detection Limit (PQL) Standard
ICPOE - PE Optima

Metals (Total Recov) by EPA 200/7000 Series Methods

Sequence: 1508093

Analyte	True	Found	%R	Units
Aluminum	100	100.33	100	ug/L
Beryllium	5.00	5.8809	118	ug/L
Calcium	250	211.76	85	ug/L
Iron	100	95.098	95	ug/L
Magnesium	1000	943.45	94	ug/L
Manganese	10.0	11.741	117	ug/L
Potassium	1000	936.61	94	ug/L
Sodium	1000	925.66	93	ug/L
Zinc	50.0	54.018	108	ug/L

Recovery Control Limits: 70-130% except Pb, Tl, Sb, & Hg at 50-150%. No limits for Al, Ca, Fe, K, Mg & Na.

TechLaw Inc, ESAT Region 8

INSTRUMENT ANALYSIS SEQUENCE LOG

Analytical Method: EPA 200.2/200.7

Total Recoverable

Sequence ID#: 1508093

Instrument ID #: ICPOE - PE Optima

Solid (dry wt basis)

LSR #: A-096

Analysis ID	Sample Name	Analysis Date	Analysis Time
1508093-ICV1	Initial Cal Check	08/13/15	08:29
1508093-SCV1	Secondary Cal Check	08/13/15	08:32
1508093-ICB1	Initial Cal Blank	08/13/15	08:35
1508093-CRL1	Instrument RL Check	08/13/15	08:38
1508093-IFA1	Interference Check A	08/13/15	08:42
1508093-IFB1	Interference Check B	08/13/15	08:46
1508086-BLK1	Blank	08/13/15	08:50
1508086-SRM1	Reference	08/13/15	08:53
C150804-02	GKMSE101	08/13/15	08:56
1508086-DUP1	Duplicate	08/13/15	08:59
1508093-SRD1	Serial Dilution	08/13/15	09:02
1508086-MS1	Matrix Spike	08/13/15	09:06
C150804-06	GKMSE105	08/13/15	09:09
1508086-MS3	Matrix Spike	08/13/15	09:12
C150804-01	GKMSE100	08/13/15	09:15
1508093-CCV1	Calibration Check	08/13/15	09:21
1508093-CCB1	Calibration Blank	08/13/15	09:25
C150804-03	GKMSE102	08/13/15	09:28
C150804-04	GKMSE103	08/13/15	09:31
C150804-05	GKMSE104	08/13/15	09:34
C150804-07	GKMSE106	08/13/15	09:37
C150804-08	GKMSE107	08/13/15	09:40
C150804-09	GKMSE108	08/13/15	09:44
C150804-10	GKMSE109	08/13/15	09:47
C150804-11	GKMSE110	08/13/15	09:50
1508093-CCV2	Calibration Check	08/13/15	09:56
1508093-CCB2	Calibration Blank	08/13/15	09:59

TechLaw Inc, ESAT Region 8

INSTRUMENT ANALYSIS SEQUENCE LOG

Analytical Method: EPA 200.2 / 200.8

Total Recoverable

Sequence ID#: 1508094

Instrument ID #: ICPMS-PE DRC-II

Solid (dry wt basis)

LSR #: A-096

Analysis ID	Sample Name	Analysis Date	Analysis Time
1508094-ICV1	Initial Cal Check	08/13/15	08:31
1508094-SCV1	Secondary Cal Check	08/13/15	08:34
1508094-ICB1	Initial Cal Blank	08/13/15	08:37
1508094-CRL1	Instrument RL Check	08/13/15	08:41
1508094-IFA1	Interference Check A	08/13/15	08:44
1508094-IFB1	Interference Check B	08/13/15	08:47
1508086-BLK2	Blank	08/13/15	08:51
C150804-02	GKMSE101	08/13/15	08:54
1508086-DUP2	Duplicate	08/13/15	08:57
1508094-SRD1	Serial Dilution	08/13/15	09:00
1508086-SRM2	Reference	08/13/15	09:03
1508086-MS2	Matrix Spike	08/13/15	09:06
C150804-06	GKMSE105	08/13/15	09:09
1508086-MS4	Matrix Spike	08/13/15	09:12
C150804-01	GKMSE100	08/13/15	09:15
1508094-CCV1	Calibration Check	08/13/15	09:21
1508094-CCB1	Calibration Blank	08/13/15	09:25
C150804-03	GKMSE102	08/13/15	09:28
C150804-04	GKMSE103	08/13/15	09:31
C150804-05	GKMSE104	08/13/15	09:34
C150804-07	GKMSE106	08/13/15	09:37
C150804-08	GKMSE107	08/13/15	09:40
C150804-09	GKMSE108	08/13/15	09:44
C150804-10	GKMSE109	08/13/15	09:47
C150804-11	GKMSE110	08/13/15	09:50
1508094-CCV2	Calibration Check	08/13/15	09:56
1508094-CCB2	Calibration Blank	08/13/15	09:59

TechLaw Inc, ESAT Region 8

INSTRUMENT ANALYSIS SEQUENCE LOG

Analytical Method: 7473

Total

Sequence ID#: 1508095

Instrument ID #: NIC MA-3000

Solid (dry wt basis)

LSR #: A-096

Analysis ID	Sample Name	Analysis Date	Analysis Time
1508095-ICV1	Initial Cal Check	08/13/15	11:01
1508095-CRL1	Instrument RL Check	08/13/15	11:01
1508095-CCV1	Calibration Check	08/13/15	11:01
1508091-BLK1	Blank	08/13/15	11:01
1508091-SRM1	Reference	08/13/15	11:01
C150804-02	GKMSE101	08/13/15	11:01
1508091-DUP1	Duplicate	08/13/15	11:01
1508091-MS1	Matrix Spike	08/13/15	11:01
1508091-MSD1	Matrix Spike Dup	08/13/15	11:01
C150804-01	GKMSE100	08/13/15	11:01
C150804-03	GKMSE102	08/13/15	11:01
C150804-04	GKMSE103	08/13/15	11:01
C150804-05	GKMSE104	08/13/15	11:01
1508095-CCV2	Calibration Check	08/13/15	11:01
1508095-CCB1	Calibration Blank	08/13/15	11:01
C150804-06	GKMSE105	08/13/15	11:01
C150804-07	GKMSE106	08/13/15	11:01
C150804-08	GKMSE107	08/13/15	11:01
C150804-09	GKMSE108	08/13/15	11:01
C150804-10	GKMSE109	08/13/15	11:01
C150804-11	GKMSE110	08/13/15	11:01
1508095-CCV3	Calibration Check	08/13/15	11:01
1508095-CCB2	Calibration Blank	08/13/15	11:01